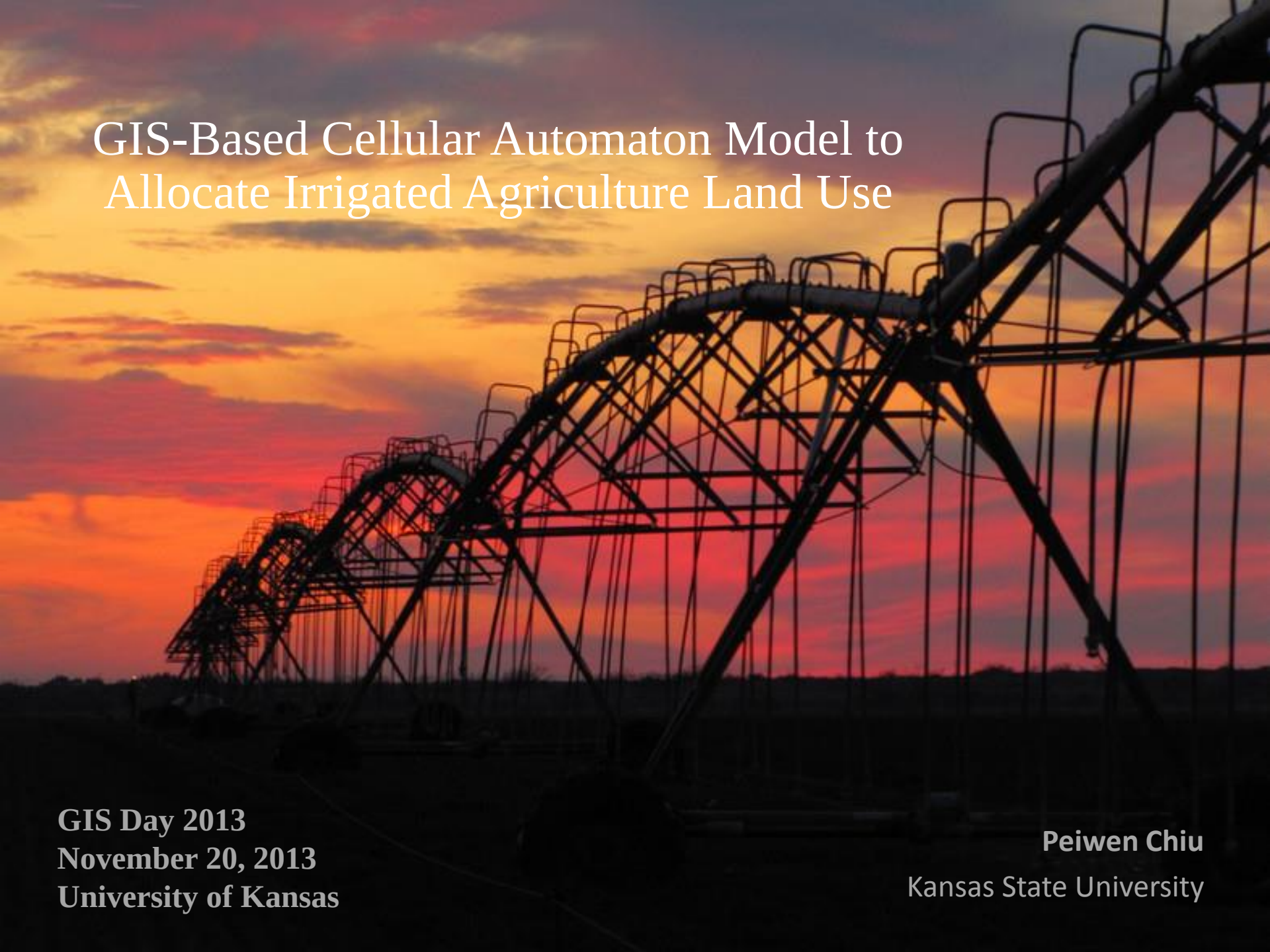


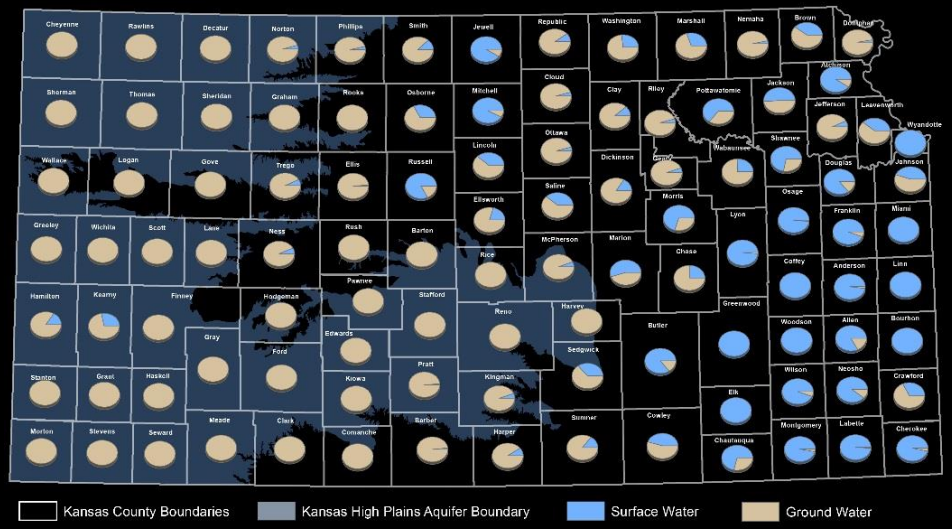
GIS-Based Cellular Automaton Model to Allocate Irrigated Agriculture Land Use

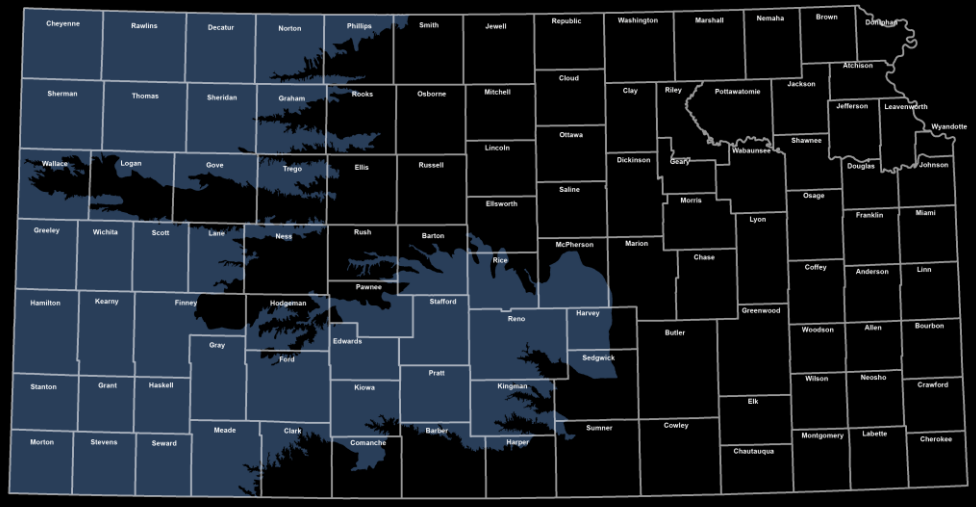
GIS Day 2013
November 20, 2013
University of Kansas

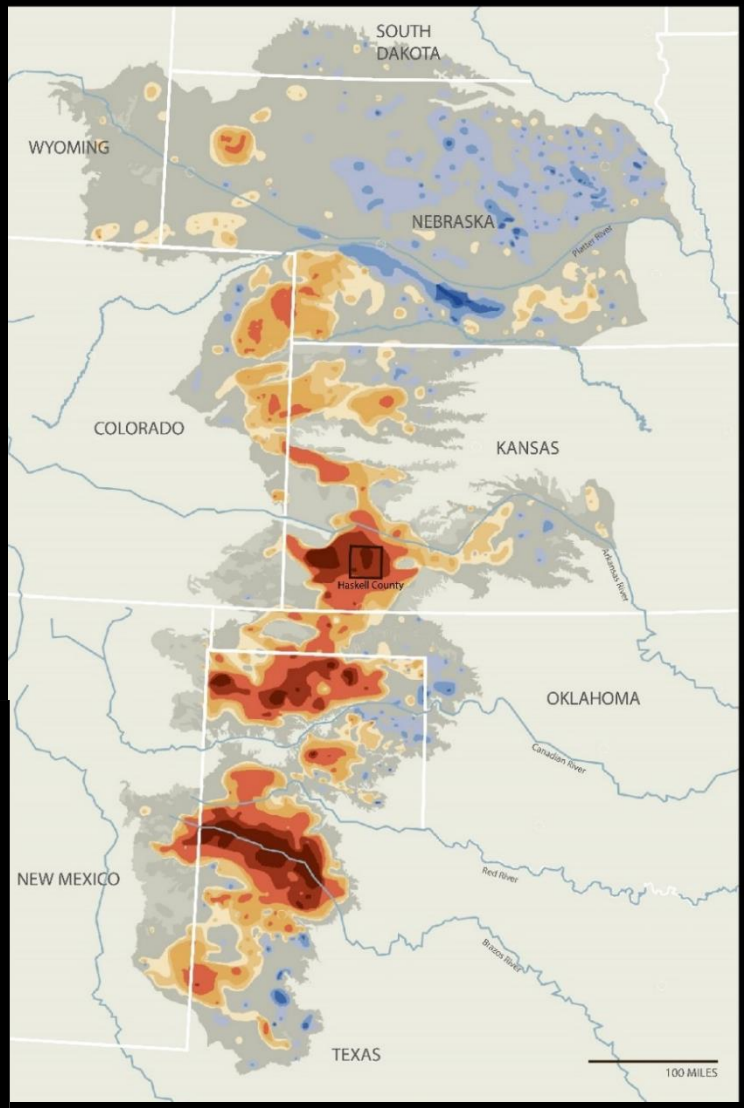
Peiwen Chiu
Kansas State University

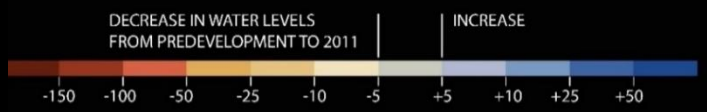
High Plains/Ogallala Aquifer

8 States 186,000 mi^2 480,000 km^2





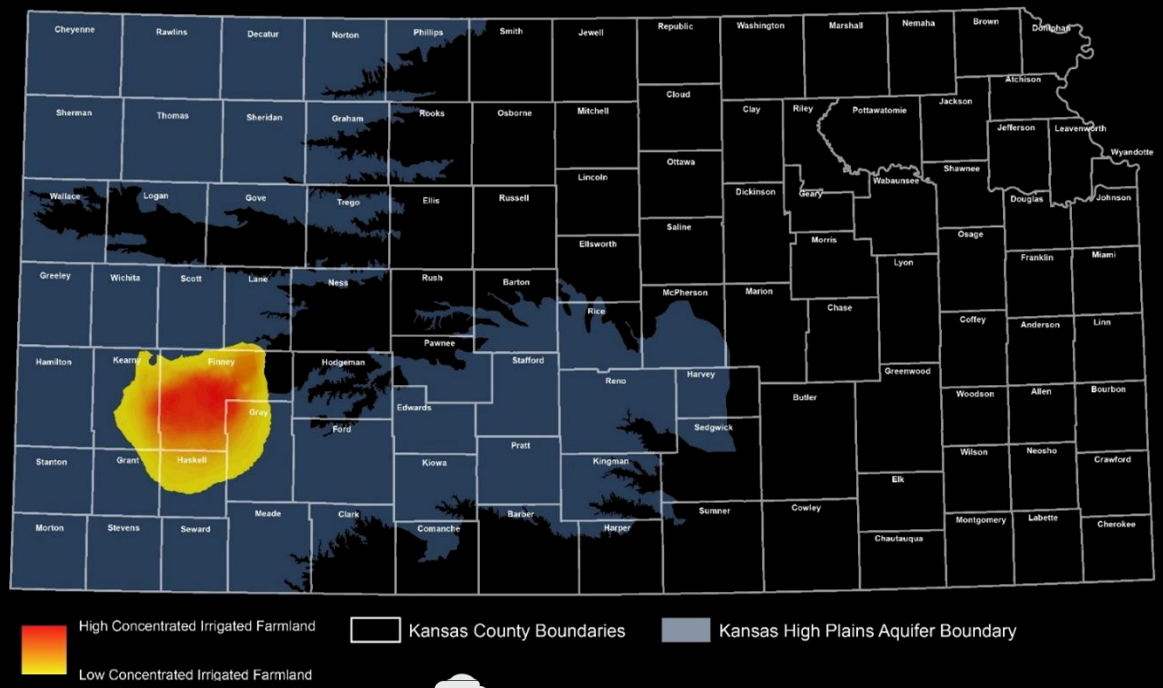


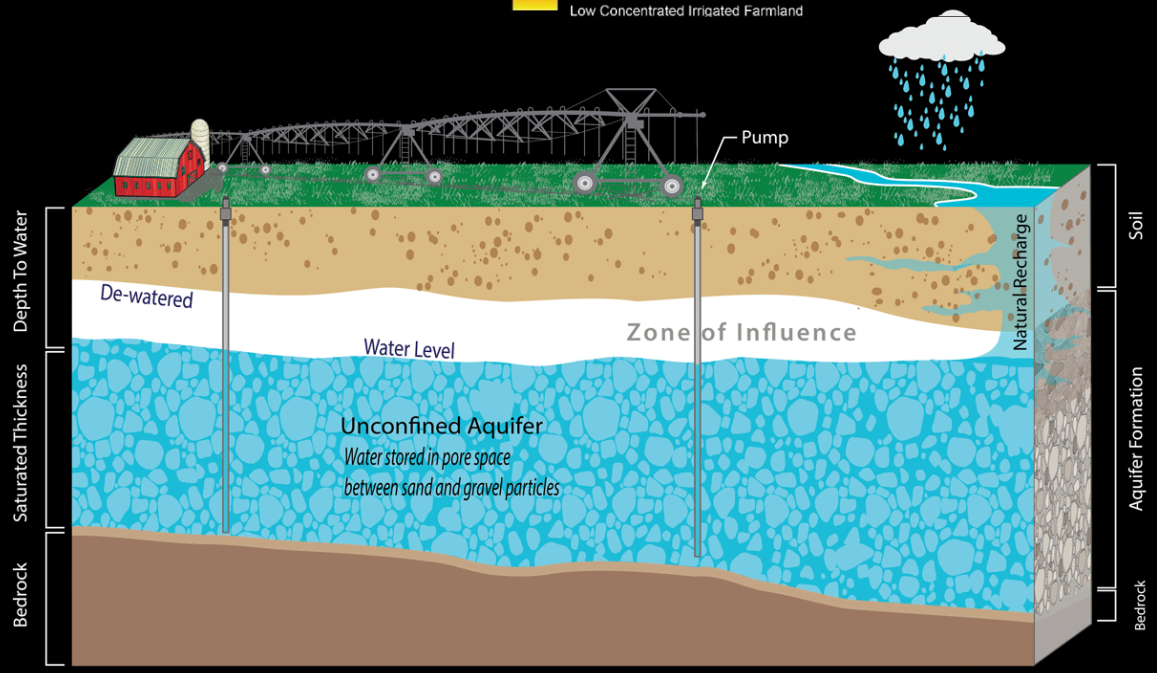


http://www.nytimes.com/interactive/2013/05/16/us/an-underground-pool-drying-up.html?ref=us

Aquifer Decline

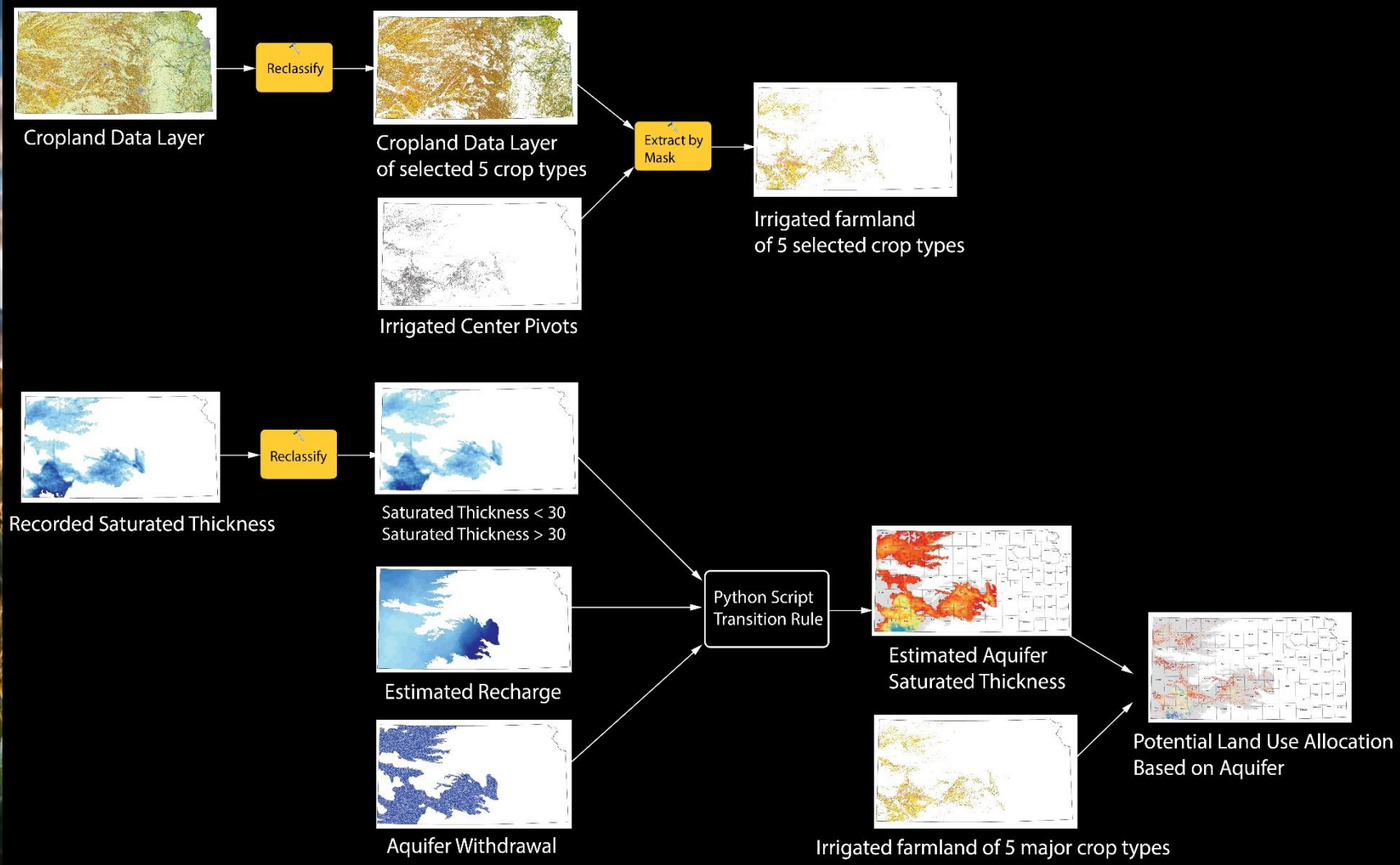
Most concentrated irrigated farmlands are generally located at the southwest Kansas.





When amount of water diverted in the zone of influence is greater than recharge, this will result decline in the water level in the Aquifer.

Work Flow


Cropland Data Layer
Reclassify
Cropland Data Layer
of selected 5 crop types
Extract by
Mask
Irrigated farmland
of 5 selected crop types
Irrigated Center Pivots
Recorded Saturated Thickness
Reclassify
Saturated Thickness < 30
Saturated Thickness > 30
Estimated Recharge
Aquifer Withdrawal
Python Script
Transition Rule
Estimated Aquifer
Saturated Thickness
Irrigated farmland of 5 major crop types
Potential Land Use Allocation
Based on Aquifer

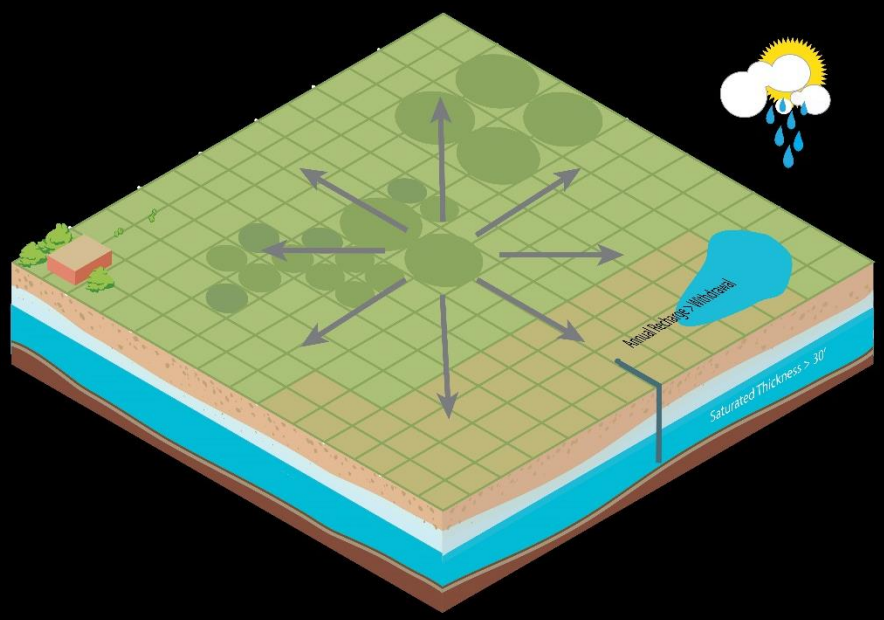
IF irrigated farmland has saturated thickness > 30 feet,
THEN stay irrigated, **ELSE** change to dry land;

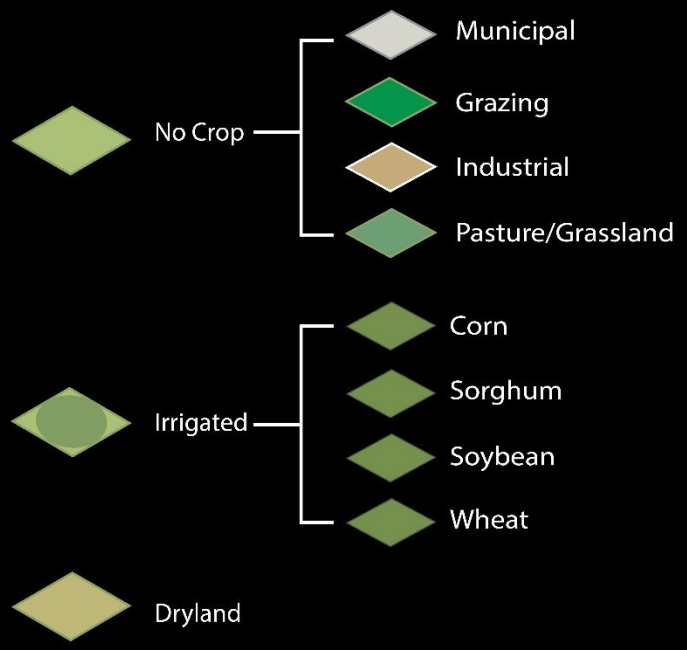
IF irrigated farmland has saturated thickness > 34 feet,
THEN corn/sorghum/soybeans/wheat as crop choice **ELSE** change to dry land;

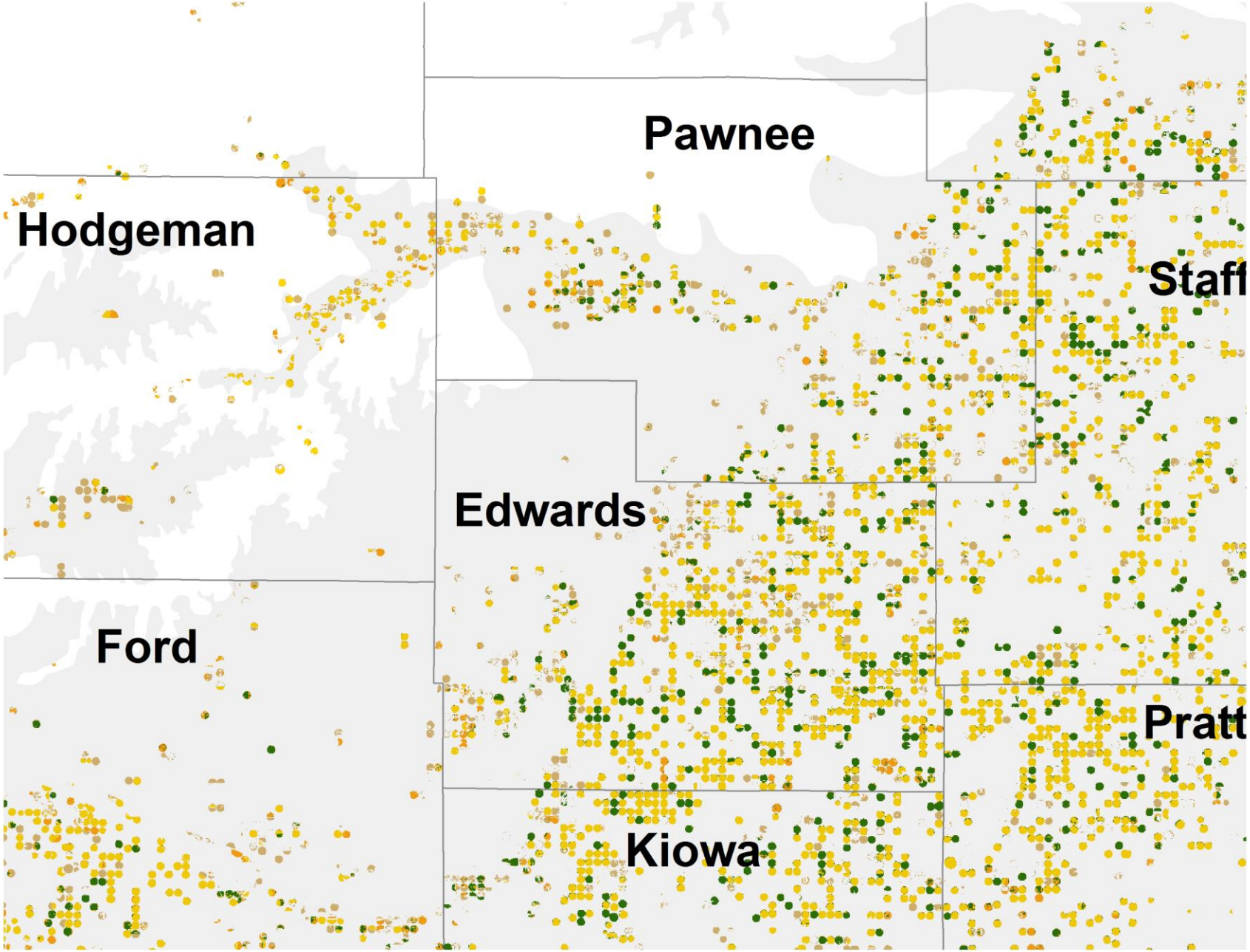
IF irrigated farmland has saturated thickness > 33 feet,
THEN sorghum/soybeans/wheat as crop choice **ELSE** change to dry land;

IF irrigated farmland has saturated thickness > 32 feet,
THEN soybeans/wheat as crop choice **ELSE** change to dry land;

IF irrigated farmland has saturated thickness > 31 feet,
THEN wheat as crop choice **ELSE** change to dry land;

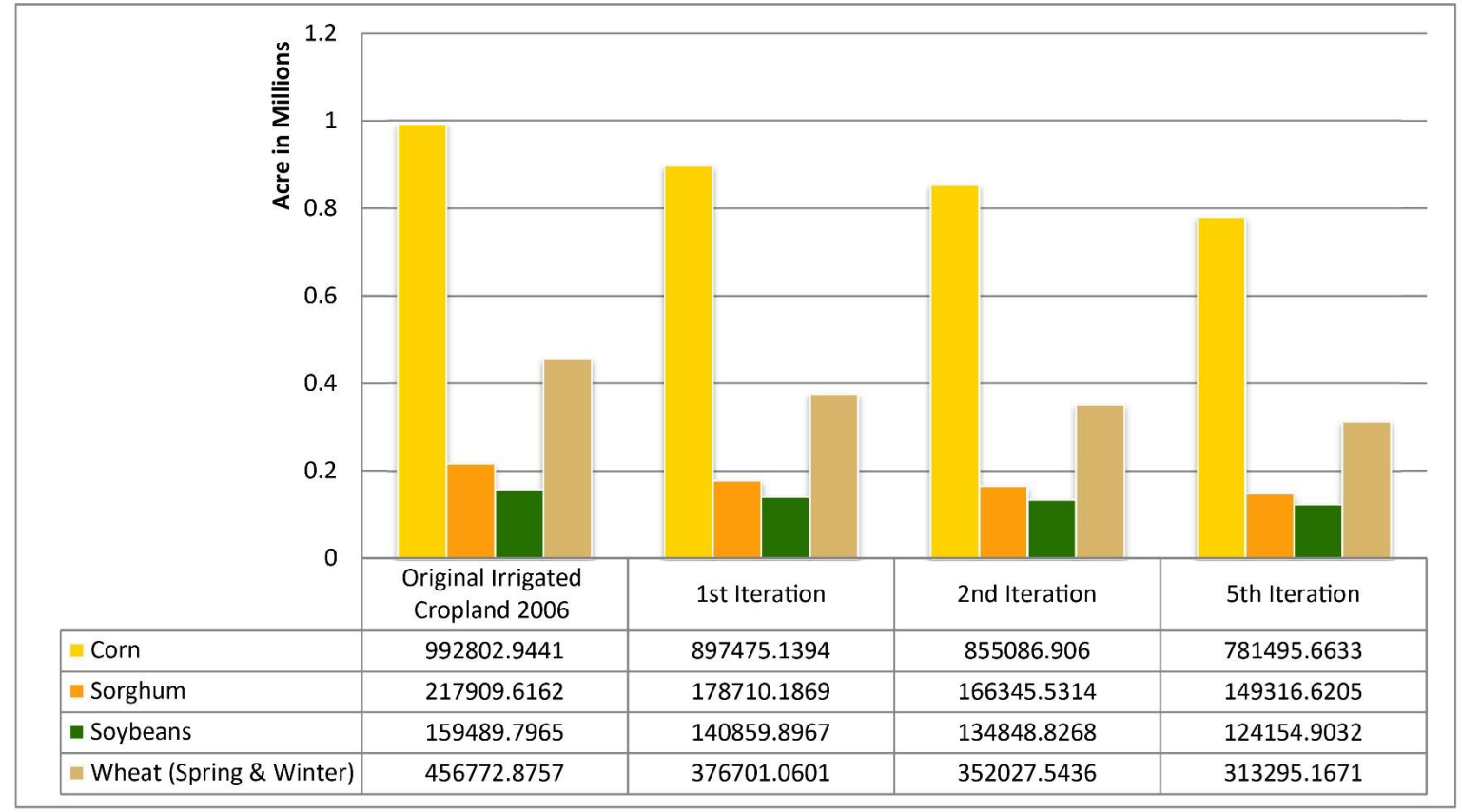






Original Irrigated Cropland 2006

What's Next



	Original Irrigated Cropland 2006	1st Iteration	2nd Iteration	5th Iteration
Corn	992802.9441	897475.1394	855086.906	781495.6633
Sorghum	217909.6162	178710.1869	166345.5314	149316.6205
Soybeans	159489.7965	140859.8967	134848.8268	124154.9032
Wheat (Spring & Winter)	456772.8757	376701.0601	352027.5436	313295.1671

Comparison of Acreage From the Model Iterations

- Further Validation of the model
- Using real numbers for the variables
- Streamline modeling process

Thank you!

Research Supporters

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This work was supported in part by the National Science Foundation (grant GEO0909515) and the United States Department of Agriculture/Agricultural Research Service (Ogallala Aquifer Initiative). Any findings, opinions, conclusions, or recommendations expressed herein are those of the authors and do not necessarily reflect the views of any funding units.